

**CLAIMS**

What is claimed is:

1        1. A method applicable within a mobile communication system for  
2        adaptively allocating a downlink data rate to an access terminal to compensate for  
3        channel fading, said method comprising:

4                4. selecting a downlink data rate in accordance with a determined signal-to-  
5        noise level, wherein said downlink data rate is associated with a specified signal-  
6        to-noise threshold to achieve a specified packet error rate;

7                7. transmitting a packet to an access terminal at said selected downlink data  
8        rate; and

9                9. responsive to successfully decoding said packet, decreasing the signal-to-  
10      noise threshold specified for said selected downlink data rate.

1        1. The method of claim 1, wherein said determined signal-to-noise level at  
2        said access terminal is a ratio of the signal strength of an allocated access terminal  
3        channel to the combined external signal strength.

1        3. The method of claim 1, wherein said selecting a downlink data rate is  
2        preceded by determining a signal-to-noise level at said access terminal.

1        4. The method of claim 1, wherein said selecting a downlink data rate further  
2        comprises:

3               comparing said determined signal-to-noise level with a plurality of signal-  
4               to-noise threshold values, wherein each of said plurality of signal-to-noise  
5               threshold values is associated with a downlink data rate; and

6               selecting a highest downlink data rate corresponding to one of said  
7               plurality of signal-to-noise threshold values that does not exceed said determined  
8               signal-to-noise level.

1               5. The method of claim 4, wherein said mobile communication system  
2               includes selectable data rate control sets in which each of said plurality of signal-  
3               to-noise threshold values is associated with a corresponding downlink data rate for  
4               said specified packet error rate, and wherein two or more of said plurality of  
5               signal-to-noise threshold values that do not exceed said determined signal-to-noise  
6               level are associated with said highest downlink data rate, said method further  
7               comprising:

8               8       comparing the relative values of said two or more signal-to-noise threshold  
9               values; and

10              10      selecting a data rate control set corresponding to the lowest among said  
11              11      two or more signal-to-noise threshold values.

1               1       6. The method of claim 1, further comprising:

2               2       responsive to unsuccessfully decoding said packet, increasing the signal-  
3               3       to-noise threshold specified for said selected downlink data rate.

1               1       7. The method of claim 6, wherein said increasing the signal-to-noise  
2               2       threshold specified for said selected downlink data rate comprises:

3 computing an increased signal-to-noise threshold specified for said  
4 selected downlink data rate in accordance with the relation:

$$T = T_j + \Delta_{local}$$

5 wherein  $T$  represents the increased signal-to-noise threshold associated with the  
6 selected downlink data rate,  $T_j$  represents the current signal-to-noise threshold  
7 value associated with the selected downlink data rate, and  $\Delta_{local}$  represents a local  
8 data rate control delta value.

1 8. The method of claim 7, wherein said mobile communication system  
2 includes selectable data rate control sets in which each of said plurality of signal-  
3 to-noise threshold values is associated with a corresponding downlink data rate for  
4 said specified packet error rate, said method further comprising:  
5

6 responsive to unsuccessfully decoding said packet, increasing each of said  
7 plurality of signal-to-noise threshold values in accordance with the relation:

$$T = T_i + \Delta_{global}$$

8 wherein  $T$  represents the increased value for the  $i^{th}$  signal-to-noise threshold value  
9 among said plurality of signal-to-noise threshold values,  $T_i$  represents current  
10 value for the  $i^{th}$  signal-to-noise threshold value among said plurality of signal-to-  
11 noise threshold values,  $PER$  represents said specified packet error rate, and  $\Delta_{global}$   
represents a global data rate control delta value.

1 9. The method of claim 1, wherein said decreasing the signal-to-noise  
2 threshold specified for said selected downlink data rate comprises:  
3

4 computing a decreased signal-to-noise threshold specified for said selected  
downlink data rate in accordance with the relation:

$$T = T_j - (PER * \Delta_{local})$$

5 wherein  $T$  represents the decreased signal-to-noise threshold value associated with  
6 the selected downlink data rate,  $T_i$  represents the current signal-to-noise threshold  
7 value associated with the selected downlink data rate,  $PER$  represents said  
8 specified packet error rate, and  $\Delta_{local}$  represents a local data rate control delta  
9 value.

1 10. The method of claim 9, wherein said mobile communication system  
2 includes selectable data rate control sets in which each of said plurality of signal-  
3 to-noise threshold values is associated with a corresponding downlink data rate for  
4 said specified packet error rate, said method further comprising:  
5

6 responsive to successfully decoding said packet, decreasing each of said  
7 plurality of signal-to-noise threshold values in accordance with the relation:  
8

$$T = T_i - (PER * \Delta_{global})$$

9 wherein  $T$  represents the decreased signal-to-noise threshold,  $T_i$  represents the  $i^{\text{th}}$   
10 signal-to-noise threshold value among said plurality of signal-to-noise threshold  
values,  $PER$  represents said specified packet error rate, and  $\Delta_{global}$  represents a  
global data rate control delta value.

1 11. A mobile communication system for adaptively allocating a downlink data  
2 rate to an access terminal to compensate for channel fading, said mobile  
3 communication system comprising:  
4

5 processing means for selecting a downlink data rate in accordance with a  
6 determined signal-to-noise level, wherein said downlink data rate is associated  
7 with a specified signal-to-noise threshold to achieve a specified packet error rate;  
8

7 air-interface transmission means for transmitting a packet to an access  
8 terminal at said selected downlink data rate; and  
9

9 processing means responsive to successfully decoding said packet for  
10 decreasing the signal-to-noise threshold specified for said selected downlink data  
11 rate.

1 12. The mobile communication system of claim 11, wherein said determined  
2 signal-to-noise level at said access terminal is a ratio of the signal strength of a  
3 pilot channel to the combined external signal strength.

1 13. The mobile communication system of claim 11, further comprising signal  
2 detection and processing means for determining a signal-to-noise level at said  
3 access terminal.

1 14. The mobile communication system of claim 11, wherein said processing  
2 means for selecting a downlink data rate further comprises:

3 processing means for comparing said determined signal-to-noise level with  
4 a plurality of signal-to-noise threshold values, wherein each of said plurality of  
5 signal-to-noise threshold values is associated with a downlink data rate; and

6 processing means for selecting a highest downlink data rate corresponding  
7 to one of said plurality of signal-to-noise threshold values that does not exceed  
8 said determined signal-to-noise level.

1 15. The mobile communication system of claim 14, further comprising  
2 memory containing selectable data rate control sets in which each of said plurality  
3 of signal-to-noise threshold values is associated with a corresponding downlink  
4 data rate for said specified packet error rate, and wherein two or more of said  
5 plurality of signal-to-noise threshold values that do not exceed said determined  
6 signal-to-noise level are associated with said highest downlink data rate, said  
7 mobile communication system further comprising:

8 processing means for comparing the relative values of said two or more  
9 signal-to-noise threshold values; and

10 processing means for selecting a data rate control set corresponding to the  
11 lowest among said two or more signal-to-noise threshold values.

1 16. The mobile communication system of claim 11, further comprising:

2 processing means responsive to unsuccessfully decoding said packet for  
3 increasing the signal-to-noise threshold specified for said selected downlink data  
4 rate.

1 17. The mobile communication system of claim 16, wherein said processing  
2 means for increasing the signal-to-noise threshold specified for said selected  
3 downlink data rate comprises:

4 processing means for computing an increased signal-to-noise threshold  
5 specified for said selected downlink data rate in accordance with the relation:

$$T = T_j + \Delta_{local}$$

6 wherein  $T$  represents the increased signal-to-noise threshold associated with the  
7 selected downlink data rate,  $T_j$  represents the current signal-to-noise threshold  
8 value associated with the selected downlink data rate, and  $\Delta_{local}$  represents a local  
9 data rate control delta value.

1 18. The mobile communication system of claim 17, further comprising  
2 memory containing selectable data rate control sets in which each of said plurality  
3 of signal-to-noise threshold values is associated with a corresponding downlink

4 data rate for said specified packet error rate, said mobile communication system  
5 further comprising:

6 processing means responsive to unsuccessfully decoding said packet for  
7 increasing each of said plurality of signal-to-noise threshold values in accordance  
8 with the relation:

$$T = T_i + \Delta_{global}$$

9 wherein  $T$  represents the increased value for the  $i^{th}$  signal-to-noise threshold value  
10 among said plurality of signal-to-noise threshold values,  $T_i$  represents current  
11 value for the  $i^{th}$  signal-to-noise threshold value among said plurality of signal-to-  
12 noise threshold values,  $PER$  represents said specified packet error rate, and  $\Delta_{global}$   
13 represents a global data rate control delta value.

1 19. The mobile communication system of claim 11, wherein said processing  
2 means for decreasing the signal-to-noise threshold specified for said selected  
3 downlink data rate comprises:

4 processing means for computing a decreased signal-to-noise threshold  
5 specified for said selected downlink data rate in accordance with the relation:

$$T = T_j - (PER * \Delta_{local})$$

6 wherein  $T$  represents the decreased signal-to-noise threshold value associated with  
7 the selected downlink data rate,  $T_j$  represents the current signal-to-noise threshold  
8 value associated with the selected downlink data rate,  $PER$  represents said  
9 specified packet error rate, and  $\Delta_{local}$  represents a local data rate control delta  
10 value.

1 20. The mobile communication system of claim 19, further comprising  
2 memory for storing selectable data rate control sets in which each of said plurality

3 of signal-to-noise threshold values is associated with a corresponding downlink  
4 data rate for said specified packet error rate, said mobile communication system  
5 further comprising:

6 processing means responsive to successfully decoding said packet for decreasing  
7 each of said plurality of signal-to-noise threshold values in accordance with the  
8 relation:

$$T = T_j - (PER * \Delta_{local})$$

9 wherein  $T$  represents the decreased signal-to-noise threshold ,  $T_i$  represents the i<sup>th</sup>  
10 signal-to-noise threshold value among said plurality of signal-to-noise threshold  
11 values,  $PER$  represents said specified packet error rate, and  $\Delta_{global}$  represents a  
12 global data rate control delta value.

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